



UNIVERSITÀ DI PAVIA

Anno Accademico 2021/2022

ANALITICAL CHEMISTRY OF POLLUTANTS

Enrollment year	2020/2021
Academic year	2021/2022
Regulations	DM270
Academic discipline	CHIM/01 (ANALYTICAL CHEMISTRY)
Department	DEPARTMENT OF BIOLOGY AND BIOTECHNOLOGY "LAZZARO SPALLANZANI"
Course	EXPERIMENTAL AND APPLIED BIOLOGY
Curriculum	Biologia ambientale e biodiversità
Year of study	2°
Period	1st semester (01/10/2021 - 14/01/2022)
ECTS	6
Lesson hours	48 lesson hours
Language	Italian
Activity type	ORAL TEST
Teacher	STURINI MICHELA (titolare) - 5 ECTS CANOVA LUCA - 1 ECTS
Prerequisites	Knowledge of the topics covered in the following courses: General and Inorganic Chemistry, Organic Chemistry and Analytical Chemistry.
Learning outcomes	The aim of the course is to introduce students to the major chemical and physico-chemical processes occurring both in natural and impacted environments, and some advanced oxidation processes for water depollution from emerging contaminants. The course will be implemented with insights about pollution effects on individuals, populations and communities, on tissues and organs, from cellular to physiological-behavioral level.
Course contents	Water: physico-chemical properties of water and bodies of water. Aquatic life. Aquatic cycle. Aquatic chemistry: redox processes, complexation and chelation, precipitation and solubilization reactions.

Colloidal particles. Polyphosphates in water and eutrophication. Soil. Inorganic components of soil. Organic matter in soil: humic and fulvic acids. Clays. Sediments. Water pollution effects on the general functioning and physiology of living organisms. A case study: alteration of reproductive behavior in fish.

Atmosphere: atmospheric composition. Ozone. Gaseous inorganic air pollutants: natural, anthropogenic, primary and secondary. Particulate matter. Acid rain. Greenhouse effect. Photochemical smog. Global climatic change. Air pollution effects: oxidative stress on birds and mammals, offspring survival and reduction of reproductive fitness.

Heavy metals: essential and/or toxic, extraction, use and disposal. Pesticides and natural product insecticides, chemical characterization, toxic effects, bioaccumulation and biomagnification.

AOM purification methods. Pharmaceuticals as emerging pollutants. Bioremediation of contaminated soil. Photodegradation: main photochemical decompositions and their role in remediation. Heavy metal pollution effects: bioaccumulation of methylmercury in predatory fish.

Endocrine disruptors effects on top predators and man.

Teaching methods

Lectures

Reccomended or required readings

S.E. Manahan "Chimica dell'ambiente", Piccin 2000
 C. Baird, "Chimica Ambientale", Zanichelli 2006
 L. Campanella, M.E. Conti, "L'ambiente:conoscerlo e proteggerlo", Carocci editore 2010
 C.H. Walzer, R.M. Sibly, S.P Hopkin, D.B. Peakall, "Principles of ecotoxicology", CRC Press 2012

Assessment methods

Oral exam about the topics of the course lectures.

Further information

Oral exam about the topics of the course lectures.

Sustainable development goals - Agenda 2030

Goals: 4,6,13,14,15
[The goals](#)